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The Future of Canadian Wheat Exports to Japan: Comparing the Japanese and South Korean Noodle Flour Markets[1]

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The Issue

While the demand for wheat flour for bread is relatively static in both Japan and South Korea, consumer markets for noodles in both countries are growing in importance. Each of the two countries depends heavily on milling-wheat imports since there is very little domestic wheat production. Canadian wheat exports represent only a small share of South Korean wheat imports and about 25 percent of the wheat imported by Japan. The South Korean wheat import market was deregulated in 1990. The liberalization of wheat imports and deregulation of the Korean milling sector have intensified competition in the flour milling industries in that market. Individual millers are interested in developing new blending formulae for wheat flour in order to survive in a more competitive market environment. Japan's wheat import market, while still highly regulated, is expected to deregulate in the future and demand is expected to continue to increase for wheat flour for noodle production.

Fundamental marketing issues revolving around Canada's ability to supply wheats of the specified preferred quality to South Korea and Japan need to be examined since these may have significant implications for Canadian wheat exports to the region. South Korea provides a case study of changes that may occur in wheat demand as Japan deregulates its

wheat import market. The comparison of the markets for noodle flour in these two Asian nations is highly relevant to the ongoing debate about Canadian domestic policies for wheat breeding, exports and grain regulation.

Implications and Conclusions

A series of detailed interviews, including a survey of flour milling representatives in South Korea and Japan, revealed current miller preferences for wheat for noodle flour production. Australia has successfully marketed wheats into South Korea that closely match millers' preferences for wheat flour for noodles. Further, our interview and survey data show Australia to be recognized as the preferred supplier of wheat to South Korea's wheat market. There are differences between Japanese millers' stated preferences for various types of wheat and the types of wheat actually imported into Japan. The nature of the changes that have previously occurred in the type and source of South Korea's wheat imports suggest that with deregulation of Japan's wheat importation, the fundamental differences between Japanese millers' preferences and actual purchases is likely to be reduced or eliminated. Australia already has wheats that closely match Japanese millers' stated preferences for wheat for noodle uses and Japanese flour millers recognize Australia as a preferred supplier of wheat for noodle flour. Consequently, Australia's market share is expected to grow in this market. Canada is not recognized as a preferred supplier of wheat for the noodle market. As is the case for South Korea, Canada may not be able to supply the types of noodle wheat desired in a changing market environment in Japan. The lack of recognition of Canada as a preferred supplier and the lack of available Canadian wheat types to cater to Asian markets for noodle flour supports the need for changes in Canada's grain licensing system. This may include changes to the requirement for kernel visual distinguishability (KVD), a specification that categories of wheat be visually distinguishable.

Background

Quality differentiation is recognized as an important feature of competition amongst suppliers in the world wheat market. The importance of quality differentiation as a source of competitive advantage among exporters depends on the particular requirements of different import markets. Wheat-importing nations express demand for imported wheat that is specific to such factors as the end-use characteristics of different wheat types and the technical requirements of flour milling processes as well as prices and trade-related interventions such as tariffs. It has been postulated that the tendency toward privatization of wheat importation in many importing nations is likely to lead to greater specificity by buyers in their wheat-purchase contracts. Private buyers may have a greater incentive to evaluate the value of wheat quality and be more willing to pay premiums if higher quality enhances their profits (Dahl and Wilson, 2000).

Japanese and Korean Noodle Wheat Markets

Markets for wheat to be used in the production of noodles in Japan and South Korea were selected as import markets for analysis for several reasons. First, Japan and South Korea are case studies of interest to Canada because these are two major wheat-importing nations in Asia whose levels of imports are likely to increase in the future. Second, the noodle market is a major component of the market for imported wheat in both nations. Consumption of wheat flour in the form of noodles in South Korea increased from 23.6 percent of total flour consumption in 1981 to 50 percent in 1998 (KOFMIA, 1998). Third, the markets for noodles in Japan and South Korea are growing in importance and Korea has the highest level of instant noodle consumption in the world (Samyang, 1999; Tradescope, 1994). Due to an extended period of economic recession during the last decade, numbers of consumers in Japan have tended to switch from consumption of western dishes at upscale restaurants to consumption of noodles in relatively lower-priced noodle shops (Interview, 2000).

Industry observers have suggested that the Korean ramen (instant noodle) market has peaked in volume. Strategies to achieve firm growth in this market are changing from a focus on the expansion of sales volumes into marketing of higher-priced, premium noodle products, extensive product differentiation and improvements in the aesthetic and functional aspects of packaging (Samyang, 1999; Interview, 2000). These changes are of interest to other suppliers. For example, Koo, Mao and Sakurai (2001) estimated substitutability between classes of wheat from different countries of origin in the Japanese market with an emphasis on U.S. market prospects. Overall, in both Japan and South Korea, changes in the noodle market and the associated quality preferences of consumers, as expressed by millers, are expected to affect the future demand for import wheat.

Millers in South Korea categorized imported wheat into three categories: hard wheat, medium wheat and soft wheat, while millers in Japan divided imported wheat into four categories: hard wheat, semi-hard wheat, medium wheat and soft wheat. The South Korean hard wheat category has similar quality specifications to the semi-hard wheat category in Japan. Since this study includes comparison of these two markets, the hard wheat category of the South Korean market is described as “semi-hard” wheat in the remainder of this paper in order to avoid confusion in discussion. The types and classes of wheat that are exported by the United States, Australia and Canada, depicted by their commonly used trade abbreviations, are listed in table 1.

Table 1 Definitions of Wheat Class by Origin, by Category and by End-use /a

	Wheat class	Description	Wheat category /b	End-use
U.S.	WW/SW	Western White/Soft White	soft	confectionery
	HRW (13.0%)	Hard Red Winter	semi-hard	noodles/bread
	HRW (11.5%)	Hard Red Winter	medium	noodles
	DNS (14.0%)	Dark Northern Spring	hard	bread
Australia	ASW	Australian Standard White	medium	noodles
	AS	Australian Soft	soft	confectionery
	APH	Australian Prime Hard	hard	bread
	AH	Australian Hard	semi-hard	noodles/bread
	Noodle Wheat	100% Australian Noodle Wheat	medium	noodles
Canada /c	CWRS (11.5%)	Canada Western Red Spring	medium	noodles
	CWRS (12.5%)	Canada Western Red Spring	medium	noodles
	CWRS (13.5%)	Canada Western Red Spring	semi-hard	bread

/a Source: Korea Flour Mills Association (KOFMIA), 1998.

/b Note that millers in South Korea divide imported wheat into three categories: hard wheat, medium wheat and soft wheat, while millers in Japan divide imported wheat into four categories: hard wheat, semi-hard wheat, medium wheat and soft wheat. The hard wheat category from South Korea has similar quality specifications to the semi-hard wheat category in Japan. Since this study includes comparison of these two markets, the hard wheat category of South Korean market is described as “semi-hard” wheat in this study to avoid confusion.

/c Canadian 3-M (medium protein level, gluten strength and hardness) is oriented to the oriental noodle market segment (Martin and Henning, 1989). Canada would typically define CWRS 13.5% wheat as a hard wheat but we place it in the category of semi-hard to match the Japanese definitions used here.

Canadian Wheat Quality

Quality of wheat for export is regulated by the Canadian Grain Commission (CGC) through control mechanisms under the Canada Grain Act and the Canada Seed Act. One longstanding element of the Canadian wheat quality control system is the kernel visual distinguishability (KVD) requirement, enabling visually based methods of identifying varieties. Wheat varieties meeting the quality requirements of one of the seven Canadian classes of wheat must be visually distinguishable from varieties of other wheat classes in order to be registered for production and commercialization in Western Canada. The KVD rule functions as the major basis for wheat segregation within the grain handling system. Western Canada's dry climate encouraged the early use and subsequent development of high-protein, relatively low-yielding wheat. The system of KVD and associated quality regulations enabled varietal segregations to be easily checked and monitored. However, this system is recognized to have limited the development of alternate wheat types that do not meet the specified regulatory standards.

Despite its advantages (e.g., see CGC, 2000), regulations associated with KVD make it more difficult to develop and market wheat types targeted at specific international flour markets while maintaining the integrity of the wheat quality control system (CWB/CGC, 2000; Dahl and Wilson, 2000). Canada has modified its previous grain licensing procedures to include development of high-yielding "3-M" wheats (Martin and Henning, 1989). One rationale for development of Canadian 3-M wheat (medium protein level, gluten strength and hardness) was to give a capacity to focus on the Asian noodle market. However, to this point Canada has been more successful in developing red medium wheat than white medium wheat. A new hard white spring wheat variety, AC Snowbird, scheduled for contract commercial production in 2003 (Western Producer, 2002) is targeted at the Asian noodle market. Overall, Canada's white wheat tailored for Asian noodle markets is in the developmental stage (Interview, 2000) and constrained by the KVD quality system.

Methods and Data

Evaluation of flour millers' preferences in South Korea and Japan was achieved through two stages of analysis. First, the noodle wheat quality profiles that are preferred by Japanese and Korean wheat millers were identified. This component of the analysis developed and employed stated preference (SP) survey methods through in-depth interviews with Japanese and Korean millers. Information on the Japanese and Korean wheat import markets was obtained through a series of interviews with senior managers of flour mills and other industry representatives. Initial interviews focused on qualitative information and were conducted in 1998. These preliminary interviews were followed by a second series of interviews in 1999, during which survey data were obtained with the aid of questionnaires. A third round of interviews was conducted with industry

representatives in 2000 (with some updating in 2002) to verify the information gathered in the previous stages. During the 1999 interviews, survey data were collected on millers' stated choices amongst different types of wheat that embody different technical characteristics that affect end-use performance in noodle processing. The interviewer met 35 mill representatives in South Korea and 23 of these answered the full survey questionnaire. The interviewer met 57 mill representatives from Japan and 41 of these answered the full survey questionnaire.

One objective of the study was to derive profiles of noodle wheat quality preferences of millers for three different classes of wheat in both the Japanese and Korean noodle wheat markets. The data related to this objective were collected through SP survey methods. Stated preference or choice methods use surveys designed to elicit respondents' stated choices among product alternatives. Such methods are useful when actual market data are not available or when projecting likely responses to future changes, such as a change in market regulations. Each respondent was asked to make a series of "purchase choices" where each choice required them to choose among three different descriptions of wheat. The descriptions, which varied with each choice question, included price and other wheat attributes, such as protein level and country of origin. Following methods outlined by Louviere, Hensher and Swait (2000), the data were analyzed using probability models. The coefficient estimates for each product attribute can be used to forecast the probability that a particular type of wheat with specific attributes will be purchased.

In order to facilitate the decision-making process for respondents, the SP survey questionnaire was divided into two sections. The first section included product choices defined in terms of intrinsic wheat quality attributes, in addition to price. These wheat quality attributes were ash content, falling number, and test weight. The second section of the survey included product choices in terms of attributes relevant to trade contract terms, specifically protein content, country of origin, and dockage level, as well as price (table 2). The two sections provided data for two different models of millers' choices reflecting their preferences within each set of choices. To accommodate the range of potential quality specificity for the three noodle wheat classes that were identified in the first set of interviews, three separate sets of questionnaires for three different wheat categories (i.e., for semi-hard, medium and soft wheats) were developed within each of the model categories. Complete details of the survey methodology and empirical models are found in Kim (2001).

The second stage of the analysis provided an assessment of the effectiveness of each of the major wheat exporting nations in catering to the preferences of millers. This was achieved by comparing the preference profiles of buyers, from the analysis in stage one, with the actual types of wheat marketed in both Japan and South Korea by the United States, Canada and Australia.

Table 2 Preferred Product Profiles of Wheat: South Korean and Japanese Millers

Preferred Product Profiles of Wheat: South Korean Millers /a			
A. Preferred product profiles for three wheat classes relating to intrinsic wheat quality			
Factor /b	**Semi-hard wheat**	**Medium wheat**	**Soft wheat**
Ash content	1.45%	1.55%	1.55%
Falling number	380	380	380
Test weight	80	82	80
B. Preferred product profiles for three wheat classes relating to trade contract terms			
Factor	**Semi-hard wheat**	**Medium wheat**	**Soft wheat**
Protein content	12.2%	10.7%	9.5%
Country of origin	Australia	Australia	United States.
Dockage level	0.2%	0.2%	0.2%
Preferred Product Profiles of Wheat: Japanese Millers			
C. Preferred product profile for three wheat classes relating to intrinsic wheat quality			
Factor	**Hard wheat**	**Semi-hard wheat**	**Medium wheat**
Ash content	1.60%	1.45%	1.55%
Falling number	380	337	380
Test weight	84	80	80
D. Preferred product profile for three wheat classes relating to trade contract terms			
Factor	**Hard wheat**	**Semi-hard wheat**	**Medium wheat**
Protein content	14.0%	12.0%	10.7%
Country of origin	United States	Australia	Australia
Dockage level	0.2%	0.2%	0.2%

/a In Japan, hard wheat, semi-hard wheat and medium wheat classes are used to produce noodle flours, while in Korea, semi-hard wheat, medium wheat and soft wheat classes are used to produce noodle flours. Medium wheat is the primary wheat used in noodle flours.

/b Ash is the percent of wheat mass remaining after being incinerated and is a cost predictor. The ash content is a measure of bran contained in flour. “Falling number” is a measure of alpha-amylase activity in flour and has a negative effect on flour quality. Falling numbers of 250 seconds or above are indicative of sound wheat. Test weight is a measure of volume of grain and an index of flour yield potential. Protein is a key quality factor; buyers of wheat normally expect a minimum guaranteed protein content to suit their particular end use. Dockage level indicates the amount of foreign materials other than wheat. Dockage level is a measure of the cleanness of the grain.

Preferred and Actual Product Profiles

The estimated coefficients for specified alternative levels of the various identified wheat characteristics are assessed for each of the two nations, Korea and Japan, using multinomial logit models of millers' choices among the product alternatives. The preferred product profile is derived by selecting those levels of the attributes that have the highest probability of increasing the miller's choice of that product. For reasons of brevity the coefficient estimates are not reported here. The preferred profiles identified from the estimated SP models are reported in table 2.

The profiles of millers' preferences in table 2 can readily be compared with the profiles of the wheat marketed by the United States, Canada and Australia into each of the two selected import markets. Tables 3 and 4 report on attributes of wheat imports by Japan and South Korea. Comparison of the profiles in table 2 to the attributes reported in tables 3 and 4 enables an evaluation of whether or not each exporting nation is marketing wheat that closely reflects the quality preferences stated by millers in Japan and South Korea. Our discussion focuses on wheat for noodle flour.

From the product profiles of actual imports, it can be seen that Australia appears to be successful in positioning itself in the market segment for medium wheat, while the United States sells wheat with characteristics that are preferred in the smaller market segments for soft wheat in South Korea (table 5). Australia has made major inroads in the noodle wheat market in South Korea by employing "customized" production contracts and supplying a wide variety of types of wheat (Interview, 2000).

Two types of Australian wheat, ASW and AH, are recognized by Korean millers as being particularly suitable for noodle wheat flour. Korean millers use ASW and AH wheat to produce flour for high quality ramen noodles, while they use blends of HRW and WW to produce flour for ordinary quality ramen noodles (Interview, 2000). The Australian Wheat Board (AWB) currently exports "100% Australian Noodle Wheat" to South Korea (table 3). Australia has done extensive research on Korean-style wheat-based foods such as noodles, baked products and confectionery products and has applied this to develop "optimum" wheat varieties and blends acceptable to Korean tastes (USDA, 1998). Overall, it can be concluded that Australia has successfully established its wheat in the medium wheat market segment in South Korea.

Canada, the third largest wheat exporter to South Korea, has only a 5.8 percent share of this import market (table 5). Until recently Canada exported one type of wheat to South Korea, Canadian Western Red Spring (CWRS), with 13.5 percent protein content (table 4). Canada began to market CWRS with lower levels of protein content (11.5 percent and 12.5 percent) in 1998, as a means to target the medium-class market segment (KOFMIA, 2000).

Table 3 Quality Attributes of Australian Wheat for Korean and Japanese Markets

Quality Attributes of Australian Wheat for Korean Market (1998/99) /a

Attribute	ASW Blend /b (Western Australia)	**100% Australian Noodle Wheat**	**AS** /c	**AH** /d	**APH** /e
Test weight	82.5	81.5	79.5	82.0	80.5
Ash content	1.35 %	1.33 %	1.32 %	1.41%	1.63%
Protein content	10.4 %	10.2%	8.7 %	11.7 %	13.2%
Dockage	0.2 %	0.32 %	0.3 %	0.36 %	0.36 %
Falling number	452	395	353	356	490

Quality Attributes of Australian Wheat for Japanese Market (1997) /f

Attribute	**ASW** Blend (Western Australia)	**APH (13.0%)**	**APH (14.0%)**
Test weight	81	82.5	83
Ash content	1.35 %	1.33 %	1.32 %
Protein content	10.4 %	13.7%	14.7%
Dockage	0.3 %	0.2 %	0.3 %
Falling number	425	512	713

/a Source: Australian Wheat Board (AWB) Crop Report to South Korea, 1998/99

/b Australian Standard White (ASW) Blend

/c Australian Soft (AS)

/d Australian Hard (AH)

/e Australian Prime Hard (APH)

/f Wheat classes that are particularly marketed to Japan; Source: Japan Food Agency, Annual Quality Report, 1997.

Comparisons of U.S. wheat types with Japanese millers' preferences suggest that the United States appears to have a competitive position in the hard wheat and the semi-hard wheat market segments of the noodle wheat market, while Australia is competitive in the market segment for medium wheat (table 5). ASW from Australia has quality characteristics that are close to the preferred profile stated by Japanese millers (table 5).

Marketing Implications for Canada

Although all three major wheat exporters – the United States, Australia and Canada – are directing marketing efforts at the Japanese and Korean noodle wheat markets, each appears to be at a different stage of market development relative to the preferences of millers for the noodle market. Australia appears to have a strong image as a preferred supplier in the medium wheat categories in Japan and South Korea, compared to the United States and Canada (table 5). This may be due to the effective niche marketing emphasized by Australia in developing medium-class noodle wheat that meets customers' quality specifications. The wheat specifications for ASW for Japan and Korea have

Table 4 Quality Attributes of U.S. and Canadian Wheat for Korean and Japanese Markets

Quality Attributes of U.S. and Canadian Wheat for Korean Market (1998/99) /a

Attribute	**DNS (14.0%)** /b	**HRW (11.5%)** /c	**WW** /d	**CWRS (13.5%)** /e
Test weight	96	87	57	92
Ash content	1.55 %	1.52 %	1.45%	1.60 %
Protein content	13.5 %	11.3 %	9.3 %	13.4 %
Dockage	0.8 %	0.6 %	0.7 %	0.4 %
Falling number	361	335	322	327

Quality Attributes of U.S. and Canadian Wheat for Japanese Market (1997) /f

Attribute	**DNS (14.0%)**	**HRW (13.0%)**	**HRW (11.5%)**	**CWRS (13.5)**
Test weight	80	80	80.5	80.
Ash content	1.60 %	1.57 %	1.54 %	1.57%
Protein content	14.0 %	12.9 %	11.6 %	13.3 %
Dockage	0.5 %	0.5 %	0.3 %	0.2 %
Falling number	406	460	431	406

/a Source: The Quality Report: six year average (1993-98), by Cheil Chedang Inc., 1999
/b Dark Northern Spring (DNS)
/c Hard Red Winter (HRW)
/d Western White (WW)
/e Canadian Western Red Spring (CWRS)
/f Source: Japan Food Agency, Annual Quality Report, 1997

provided specific blends of different wheat classes to cater to the production of "Japanese style" and "Korean style" noodle processing flour (Shin Han, 1999).

Alston et al. (1989) and Esfahani (1995) argued that the Japanese government, through the Japan Food Agency (JFA), has managed wheat imports with quotas that favour the United States over other exporters due to the political and economic importance of that nation to Japan. Australia's market share was approximately 20 percent in Japan during the period from 1976 to 1996, while the U.S. market share in Japan was 57 percent during the same period (IWC, 1997). Thus, the preferences of Japanese millers, evidenced in our study, for wheat of Australian origin do not translate into the actual market share of Australian wheat in Japan. This observation supports the contention of Alston, Esfahani and others that political objectives have influenced Japan's wheat imports. Australia's past success in marketing wheat to South Korea and the profile of buyers' preferences suggest that Australia could benefit, through an increasing market share, from Japanese market liberalization.

In contrast to the situation in Japan, in South Korea, the stated preferences of millers for wheat of Australian origin, relative to wheat from Canada and the United States, appear to be reflected in the market shares of the three exporting nations (table 5). The market share of the United States decreased from 100 percent to 54.5 percent from 1970 to 2001, while the market share of Australia increased rapidly from zero percent to 39.7 percent from 1970 to 2001. Deregulation of wheat importation and marketing in South Korea appears to have resulted in appreciable changes in import market shares for wheat, in a manner that reflects the preferences that millers express for different wheat quality characteristics.

The results we found from interviews and from the stated choice analysis indicate that Canada has a relatively weaker position than the United States and Australia in the South Korean market with respect to the semi-hard and soft wheat categories. Canada has made modest efforts to target wheat for the Asian flour market for noodles. These results have not been successful in either South Korea or Japan. This raises issues about the ability of the Canadian wheat production and marketing system to meet the needs of the Asian noodle market. As the control of the JFA over imports is dismantled in response to the pressure of multilateral trade negotiations, the market position of Canadian wheat exports to Japan will ultimately be determined by the effectiveness of Canada's ability to supply wheat types and varieties that meet importers' preferences. Canada needs to determine if the Asian markets for noodles should be pursued and, if this is the case, to deploy more targeted product development and marketing to better match its product offerings to millers' needs.

Development of new Canadian wheat varieties for specialized markets has been hindered by a marketing system that depends upon KVD as a means of segregating wheat for different markets. Currently there is debate in the Canadian wheat industry as to

Table 5 Summary of Study Results

Attribute Correspondence /a

	South Korea	**Japan**
Hard wheat	N/A	Dark Northern Spring (DNS) - United States
Semi-hard wheat	no market leader	Hard Red Winter (HRW) - United States
Medium wheat	Australian 100% Noodle Wheat - Australia	Australian Standard White (ASW) - Australia
Soft wheat	Western White (WW)- United States	N/A

Origin Preferences by Japanese and Korean Millers /a

	South Korea	**Japan**
Hard wheat	N/A	United States
Semi-hard wheat	Australia	Australia
Medium wheat	Australia	Australia
Soft wheat	United States	N/A

Actual Market Share of Three Exporting Nations (2001) /b

	South Korea	**Japan**
Australia	54.5%	21 %
United States	39.7%	52.4%
Canada	5.8%	26.6 %

/a Comparison of preferred product profiles and actual quality reports.
/b USDA (2002)

development of a quality control system that would remove the constraints of KVD without losing its benefits. A key challenge to the Canadian wheat marketing system is to establish a wheat quality control mechanism that encourages and allows registration, handling and marketing of new wheat varieties that are targeted at the needs of buyers. Development of new wheat varieties that are targeted to buyers' preferences in the noodle market would involve additional segregations throughout the marketing system in Canada. Already these segregation challenges are being directly tested in the Canadian wheat system (Ewin, 2002).

The preferences that are reported here underlie changes in international wheat markets that have major implications for Canada's wheat marketing programs. In South Korea,

where liberalization of the import market for wheat has applied for some years, competition among exporters and purchases by importers are driven by quality differentiation that relates to millers' preferences in this market. The case of Australia's marketing success in South Korea suggests that exporters that can effectively respond and cater to importers' preferences will be able to position themselves for the long term, achieve market sales, and establish a reputation for quality products. Significant changes in the Canadian grain handling and regulatory system may be needed for Canada to compete effectively in the Japanese and South Korean wheat markets for noodle flour.

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Endnotes

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